
# Meeting Increasing Global Grain Demand Sustainably

Dr. Robb Fraley
Chief Technology Officer
Monsanto Company

# Notes

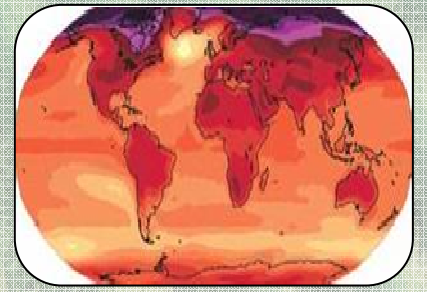
Certain statements contained in this presentation are "forward-looking statements," such as statements concerning the company's anticipated financial results, current and future product performance, regulatory approvals, business and financial plans and other non-historical facts. These statements are based on current expectations and currently available information. However, since these statements are based on factors that involve risks and uncertainties, the company's actual performance and results may differ materially from those described or implied by such forward-looking statements. Factors that could cause or contribute to such differences include, among others: continued competition in seeds, traits and agricultural chemicals; the company's exposure to various contingencies, including those related to intellectual property protection, regulatory compliance and the speed with which approvals are received, and public acceptance of biotechnology products; the success of the company's research and development activities; the outcomes of major lawsuits; developments related to foreign currencies and economies; successful operation of recent acquisitions; fluctuations in commodity prices; compliance with regulations affecting our manufacturing; the accuracy of the company's estimates related to distribution inventory levels; the company's ability to fund its short-term financing needs and to obtain payment for the products that it sells; the effect of weather conditions, natural disasters and accidents on the agriculture business or the company's facilities; and other risks and factors detailed in the company's most recent reports on Forms 10-Q and 10-K. Undue reliance should not be placed on these forward-looking statements, which are current only as of the date of this presentation. The company disclaims any current intention or obligation to update any forward-looking statements or any of the factors that may affect actual results.



RR = Roundup Ready; YGCB = YieldGard Corn Borer; RR2 = Roundup Ready Corn 2; YGVT = YieldGard VT; YGRW = YieldGard Rootworm; RR2Y = Roundup Ready 2 Yield

# Agriculture is at the Center of Many of Society's Most Important Debates

- **Global food security**
  - Enhanced productivity
  - Increased yield
  - Sustainable production
- **Water availability**
  - Drought-tolerant crops
  - Partnering to share technology with developing world farmers (WEMA)
- **Biofuels**
  - Yield technologies to help meet demand for both food **and** fuel
- **Global warming**
  - $CO_2$ footprint
  - Fertilizer use



**Technology Is Addressing These Challenges**

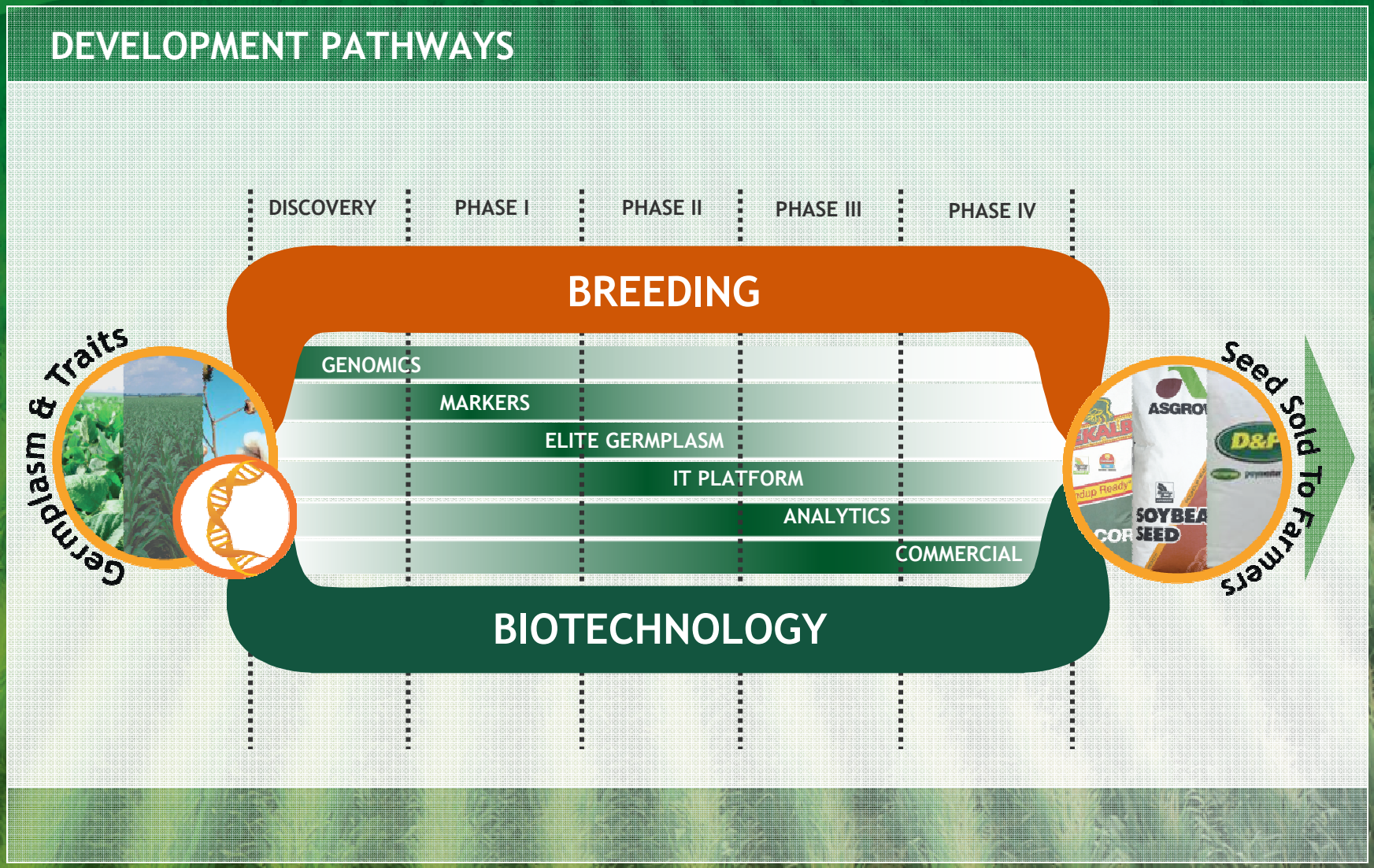
# We've Made A Commitment To Double Yield In Our Core Crops

## MONSANTO'S GLOBAL COMMITMENT TO GROWING YIELD SUSTAINABLY[SM]

MONSANTO imagine™

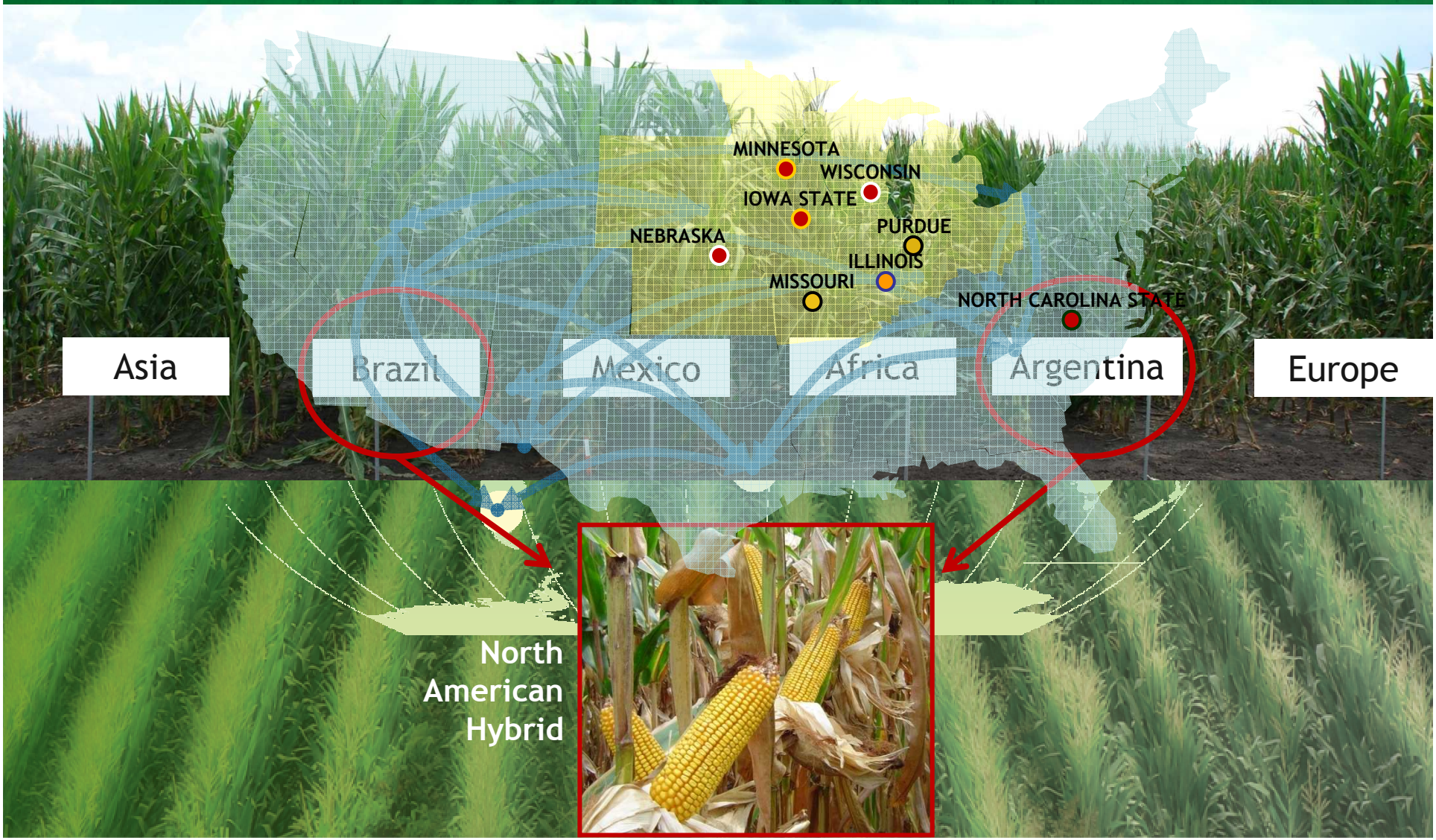
- Help farmers double corn, cotton, soybean yields by 2030 off a base of 2000
  - ✓ Industry 'catalyst' - can't do it alone
  - ✓ Establish $10M public research grant to accelerate breakthroughs in wheat and rice
- Reduce by 1/3 the cumulative amount of key resources required per unit of output
  - ✓ Develop partnerships to address key environmental issues associated with agriculture
- Improve the lives of 5M resource poor families by 2020
  - ✓ Share our expertise with resource poor farmers in a way that gives them access to technology

# Breeding and Biotech Provide Parallel R&D Paths to Commercial Products



# Most Diverse Genetic Pool Increases Depth and Breadth of Germplasm

## MONSANTO YIELD DEMONSTRATION, SUMMER 2008



# Sophisticated Technology Turns Diverse Germplasm Into Industry Leading Seeds for Farmers, Faster

SOYBEAN MEGA CHIPPER

**BENEFIT**
Accelerates screening for ideal product candidates. Allows the seed to be subsequently planted.

MRI FOR COMPOSITION ANALYSIS

**BENEFIT**
Allows scientists to examine the inside of a seed without making an incision. Allows seed to still be planted. Important for value-added traits.

HIGH THROUGHOUT DNA SEQUENCING

**BENEFIT**
This new technology generates 10x more data in a day than previously gathered in a year and for less than 10% of the original cost.

## COMBINATION OF THIS TECHNOLOGY ALLOWS MONSANTO TO:

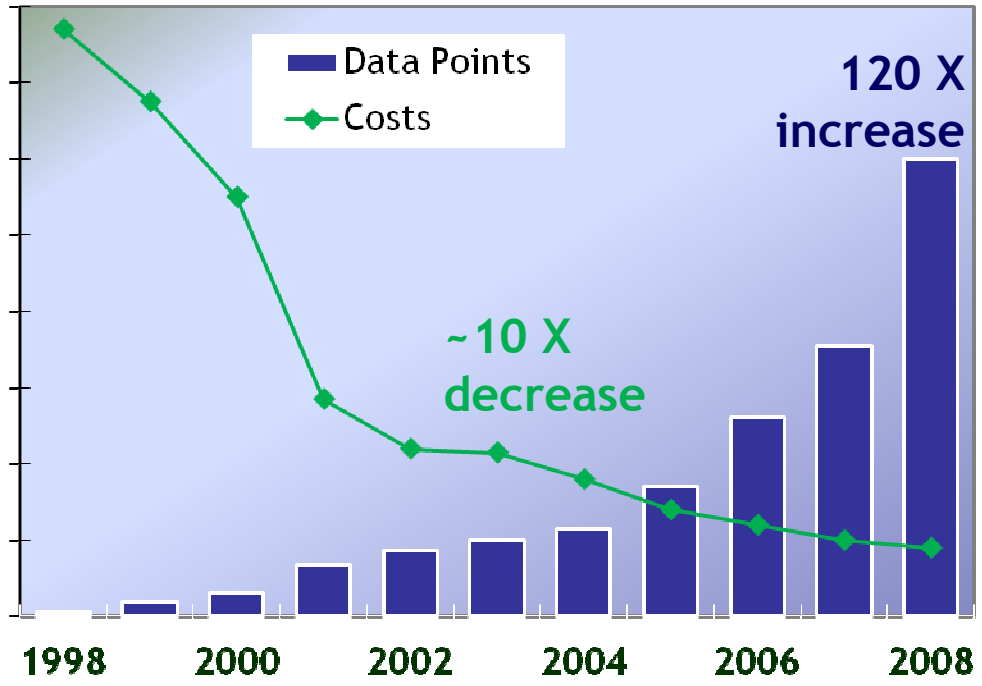
- Improve the efficiency of our breeding pipeline
- Push more genetics through the pipeline

## WHICH RESULTS IN PRODUCTS WITH:

- Increased Yield
- Improved Agronomics
- Enhanced Quality Traits

# Investment in Molecular Breeding is Focused on Maximizing Genetic Gain


Automated Marker Analysis



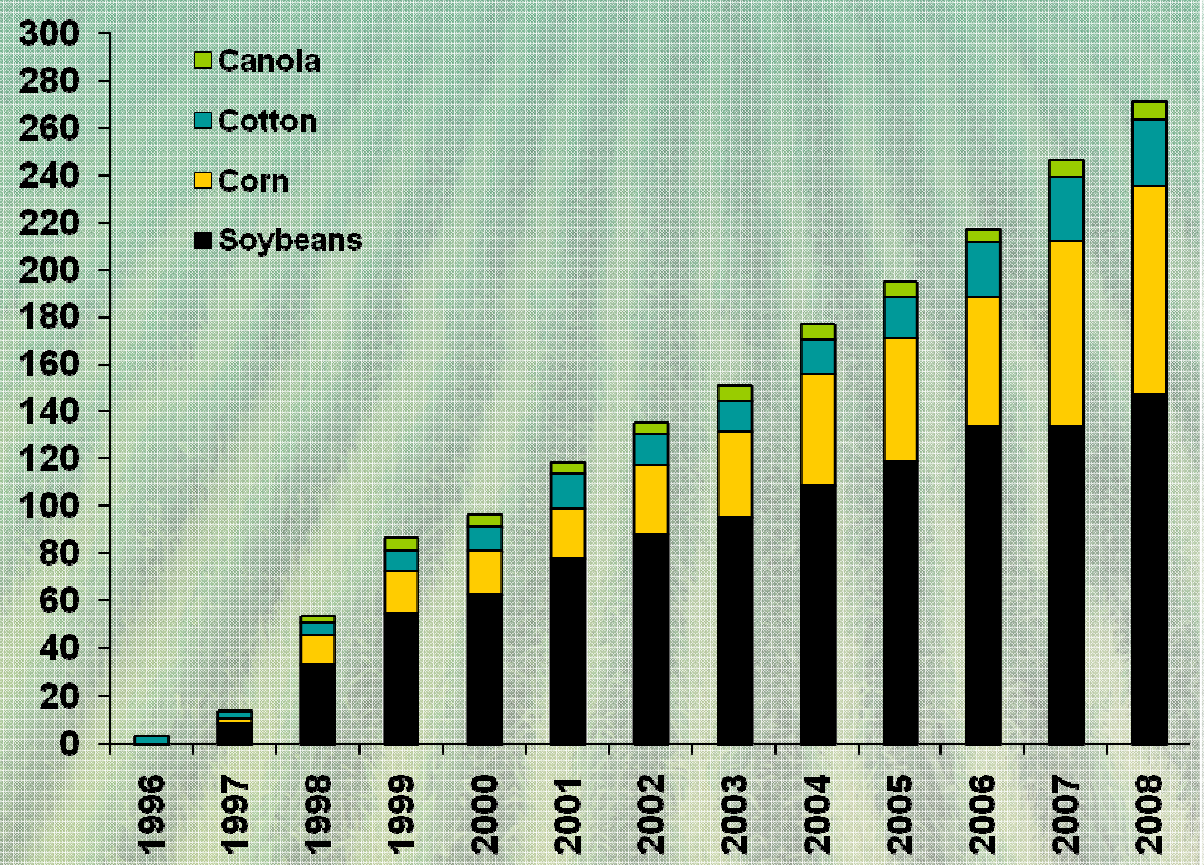

- >$100 million invested in molecular markers platform
- Staff of >150 scientists using proprietary tools are supporting the further development and use of marker technology
- Capability to analyze millions of samples in a shorter time frame
- $75 million investment in proprietary software tools
- 3 million marker-trait associations providing genome understanding

# Corn Genome Sequence Provides The Blueprint For Doubling Yield


- Start with an elite breeding line
  - Captures more than 30 years of intensive breeding effort
- Apply the latest technologies to obtain genome sequence
  - Sequence comparisons will generate millions of single nucleotide polymorphisms (SNPs)
- The sequence moves us towards high-definition molecular breeding
  - Combination of sequence and markers to derive new lines
  - High density SNPs will allow us to map more traits

# Biotech Crop Acreage Grew Again in 2008

## 13.3 MILLION FARMERS GROWING BIOTECH CROPS ON MORE THAN 2 BILLION ACRES




In 2006,

- 17 M additional acres would have been required to achieve production levels
- $6.2B global farm income benefit
- 628M lbs pesticide reduction
- 32.6 B lbs $CO_2$ emissions reduced, equal to removing 6.6 M cars from the road for a year

(Brookes & Barfoot 2008)

A new wave of adoption of biotech crops contributed to broad-based global growth.

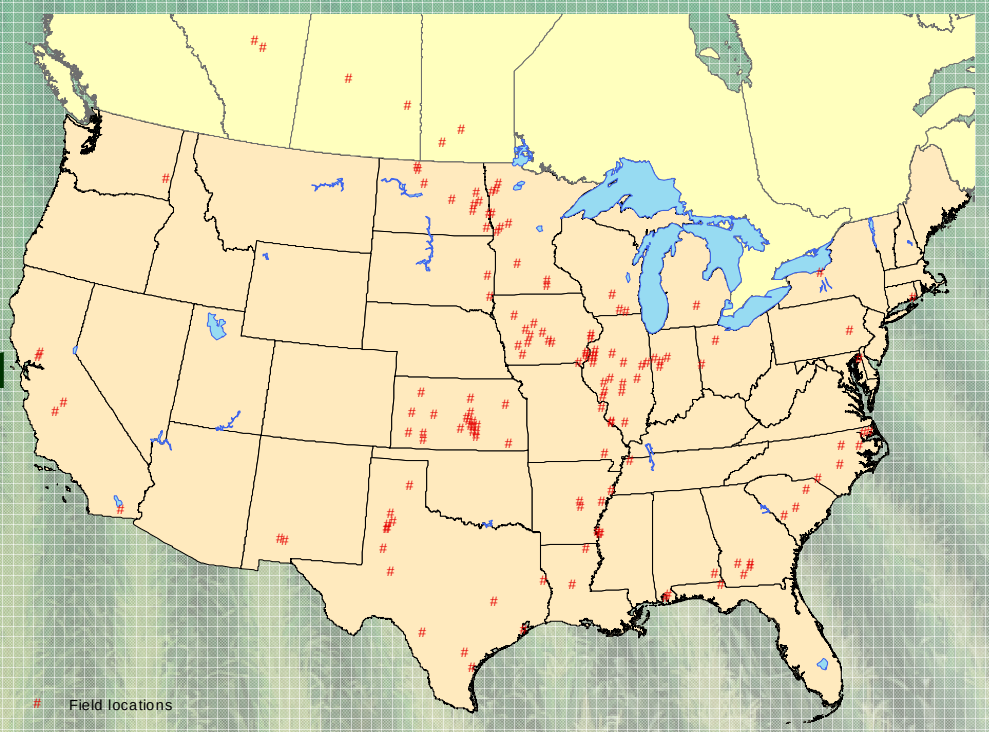
SOURCE: ISAAA and Monsanto estimates

# Biotechnology Pipeline is Dedicated to Evaluation of our Transgenic Traits in Core Crops

## THE SCALE OF OUR BIOTECH PIPELINE HAS MORE THAN TRIPLED SINCE 2005

- Events produced in transformation (~175k)
  - Corn = 94,528
  - Soy = 3,963
  - Cotton = 2,256
  - Canola = 12,849
- >2,500 constructs and ~13,000 events field tested (field & nursery)
- >330,000 Field Data Plots
- >180 Locations, 26 States and 6 Countries
- 31 Traits

### 2008 Biotech Field Trials



# Future Corn Products

- FUTURE SUITE OF STRESS TOLERANCE TRAITS AND SECOND-GEN IMPROVEMENTS BUILD ON SMARTSTAX™
- EXPECT THAT WAVE TO START AFTER THE TURN OF THE DECADE

COLD TOLERANCE

CRWIII

NITROGEN USE EFFICIENCY

DROUGHT TOLERANCE II

YIELD I

DROUGHT TOLERANCE I

YieldGard VT Triple PRO

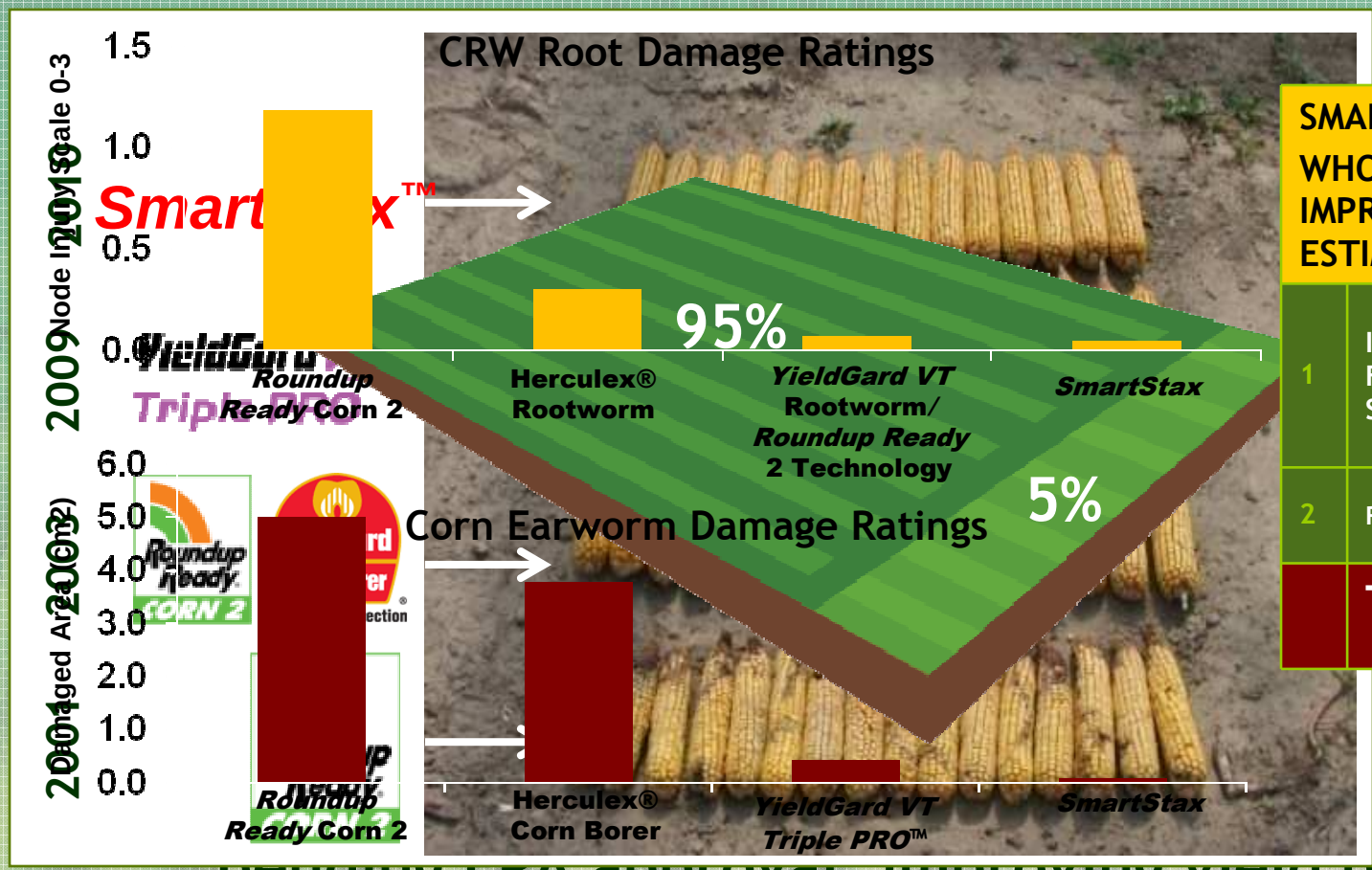
2010+ SmartStax™ (= YieldGard VT Triple PRO + HERCULEX® I HX™ + YieldGard VT Rootworm/RR2 + HERCULEX® RW HX™ + Roundup Ready TECHNOLOGY + LibertyLink Herbicide Resistance )

YieldGard VT Triple 2009

Commercialization dependent on many factors, including successful conclusion of regulatory process

# SmartStax™ Corn Increases Value on Farm Through Refuge Reduction and Improved Insect Control

## COMBINES 8 GENES IN ONE OF TOP PERFORMING HYBRIDS




| SMARTSTAX WHOLE-FARM YIELD IMPROVEMENT ESTIMATES: | |
|---|---|
| 1 | IMPROVED CONSISTENCY FOR PRIMARY AND SECONDARY PESTS [1] |
| 2 | REDUCED REFUGE [2] |
| | TOTAL: 5-10% |

1. As compared to YieldGard *VT Triple*
2. Subject to EPA approval

| Discovery | Phase 1 Proof of Concept | Phase 2 Early Development | Phase 3 Adv. Development | Phase 4 Pre-Launch | Launch |
|---|---|---|---|---|---|

* Yield benefit reflects expected yield benefit above triple-stack standard, on a per-acre and whole-farm basis as noted. Ranges may overlap. SmartStax is not registered by the U.S. EPA. It is a violation of federal law to promote or sell an unregistered pesticide.

# 2008 Dryland Field Tests Showed Lead Drought Event Increased Yield in Stressed Conditions

## DROUGHT TOLERANT CORN FAMILY: LEAD PROJECT

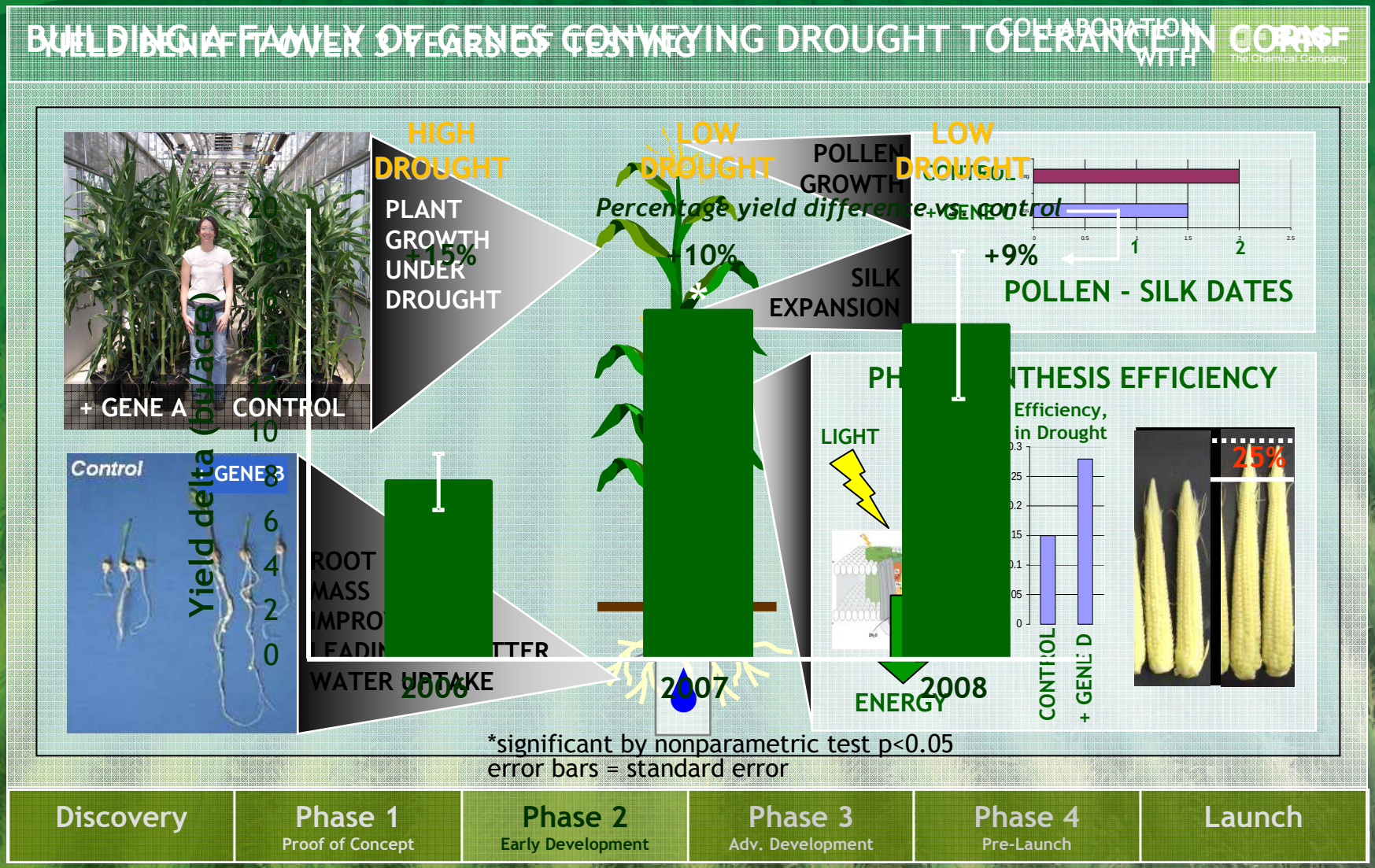
COLLABORATION WITH BASF The Chemical Company

With Gene Control

Corn with Drought Gene
Farm Progress Show, 2008


| Discovery | Phase 1<br>Proof of Concept | Phase 2<br>Early Development | Phase 3<br>Adv. Development | Phase 4<br>Pre-Launch | Launch |
|---|---|---|---|---|---|

# Drought II Has Demonstrated Efficacy in a Third Year of Testing




*significant by nonparametric test p<0.05
error bars = standard error

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# Water Efficient Maize for Africa (WEMA)

## THE PARTNERS

- African Agricultural Technology Foundation (AATF) is leading the project
- CIMMYT and Monsanto will bring best in global maize germplasm, testing and breeding methods, and biotechnology
- National Ag. Research System (NARS) participation is a crucial part of testing products and bringing WEMA to Sub-Saharan African farmers

## THE TECHNOLOGY

- Best global germplasm to combine new sources of drought tolerance and African adaptation
- More rapid gains in conventional drought tolerance through molecular breeding
- Additional drought tolerance obtained through state-of-the-art biotechnology

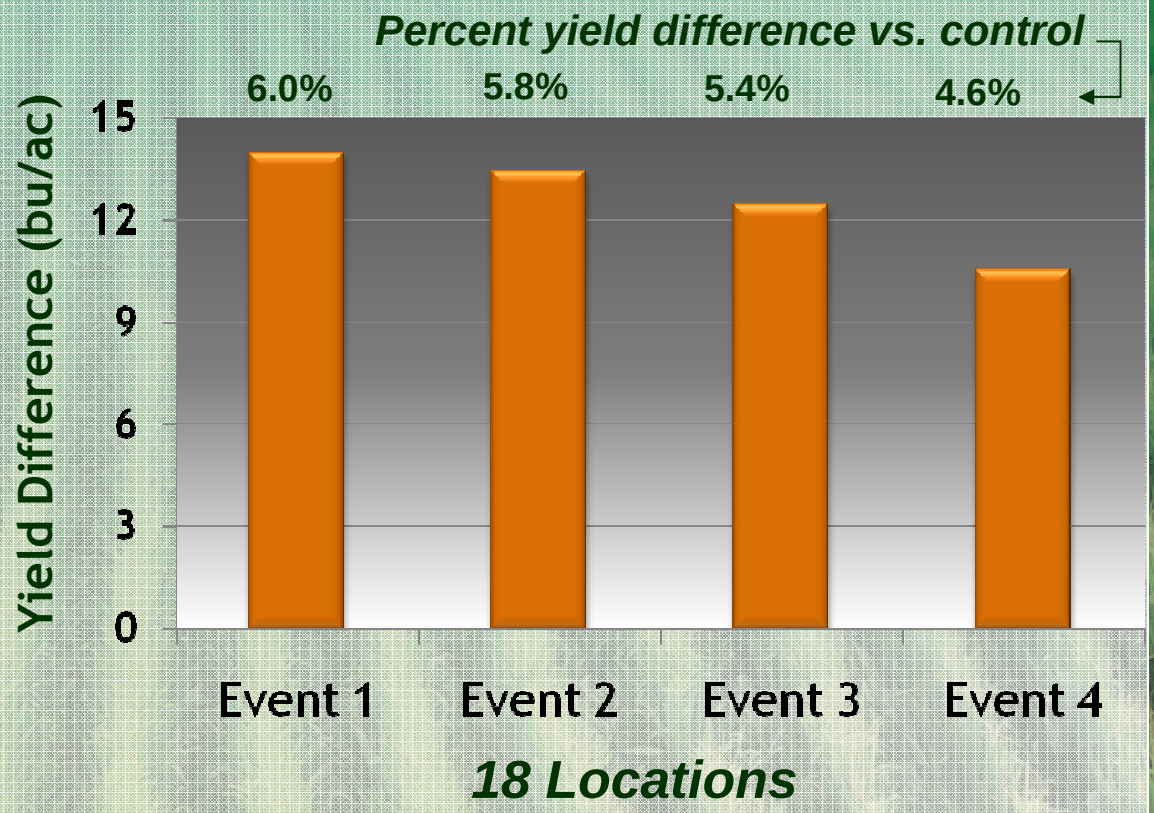
**DEDICATED TO DELIVERING WEMA**

# First Product from Higher-Yielding Corn Family Showed Improved Yield in 2008 Trials

## CORN INTRINSIC YIELD LEAD PROJECT

COLLABORATION WITH BASF The Chemical Company

- 8 potential commercial events enhanced yield over controls in the target range for the product concept
- Potential commercial events will be advanced to a more powerful trial in U.S. in 2009

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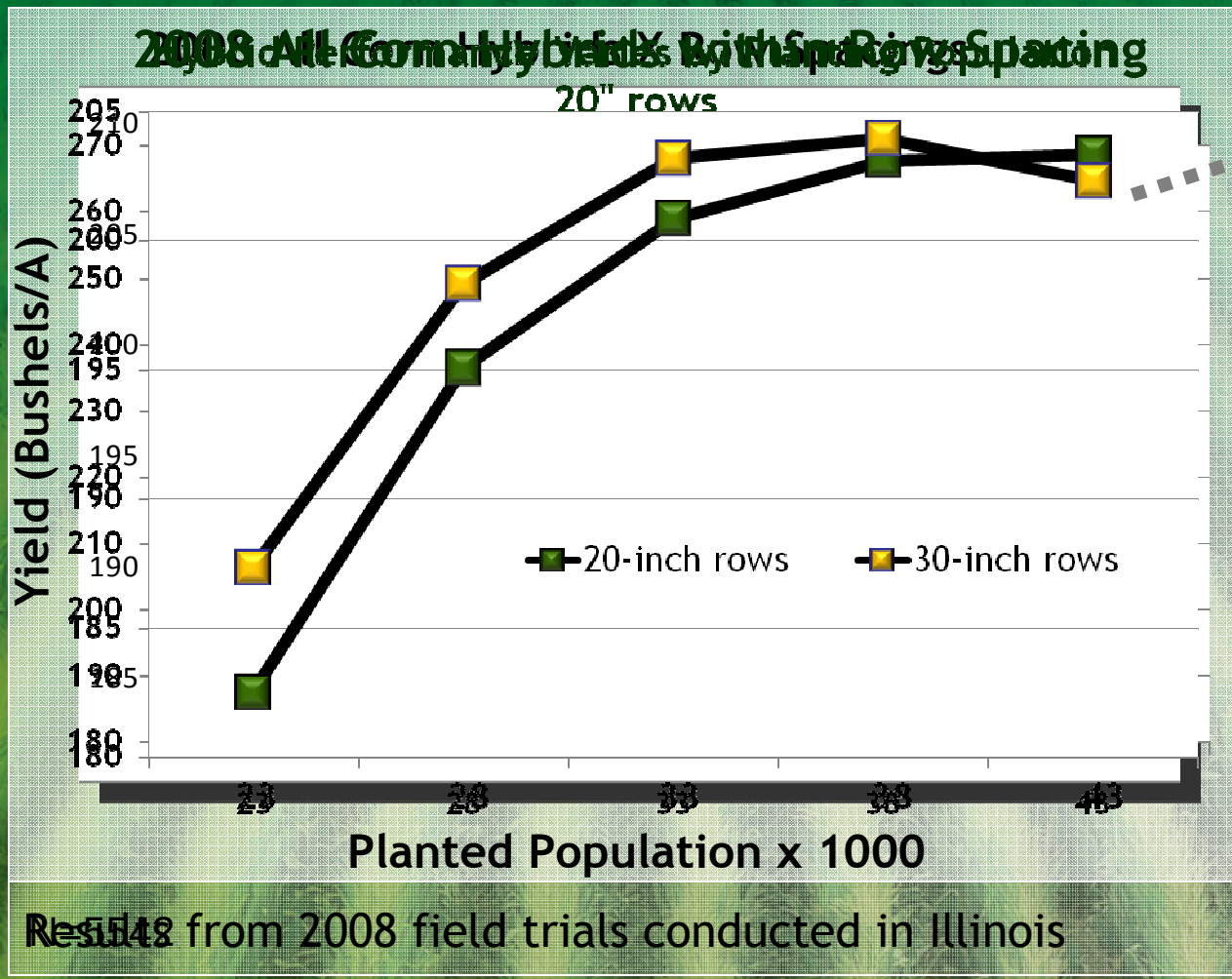
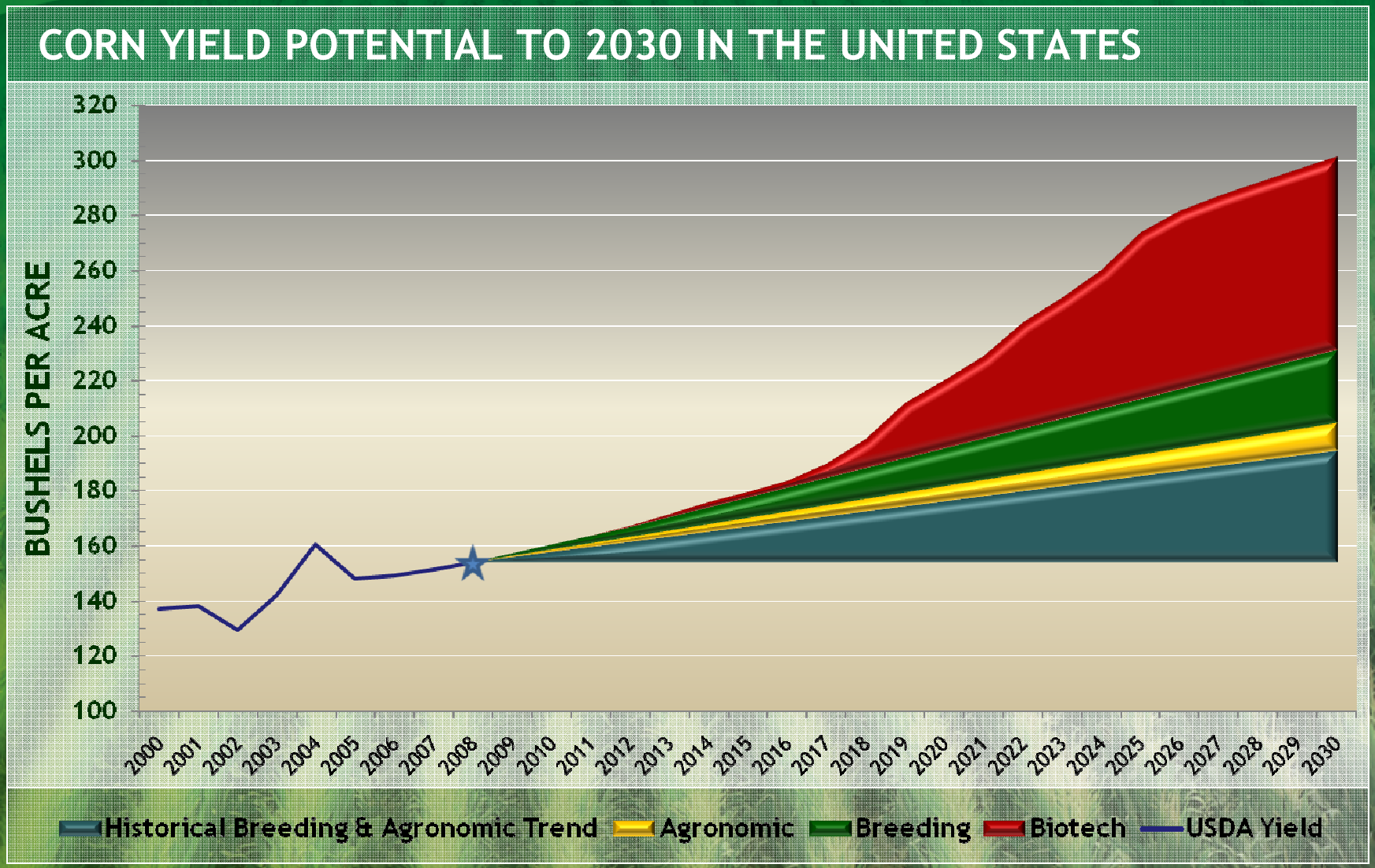
# Optimizing Agronomic Practices such as Corn Planting Density Can Result in Yield Gains





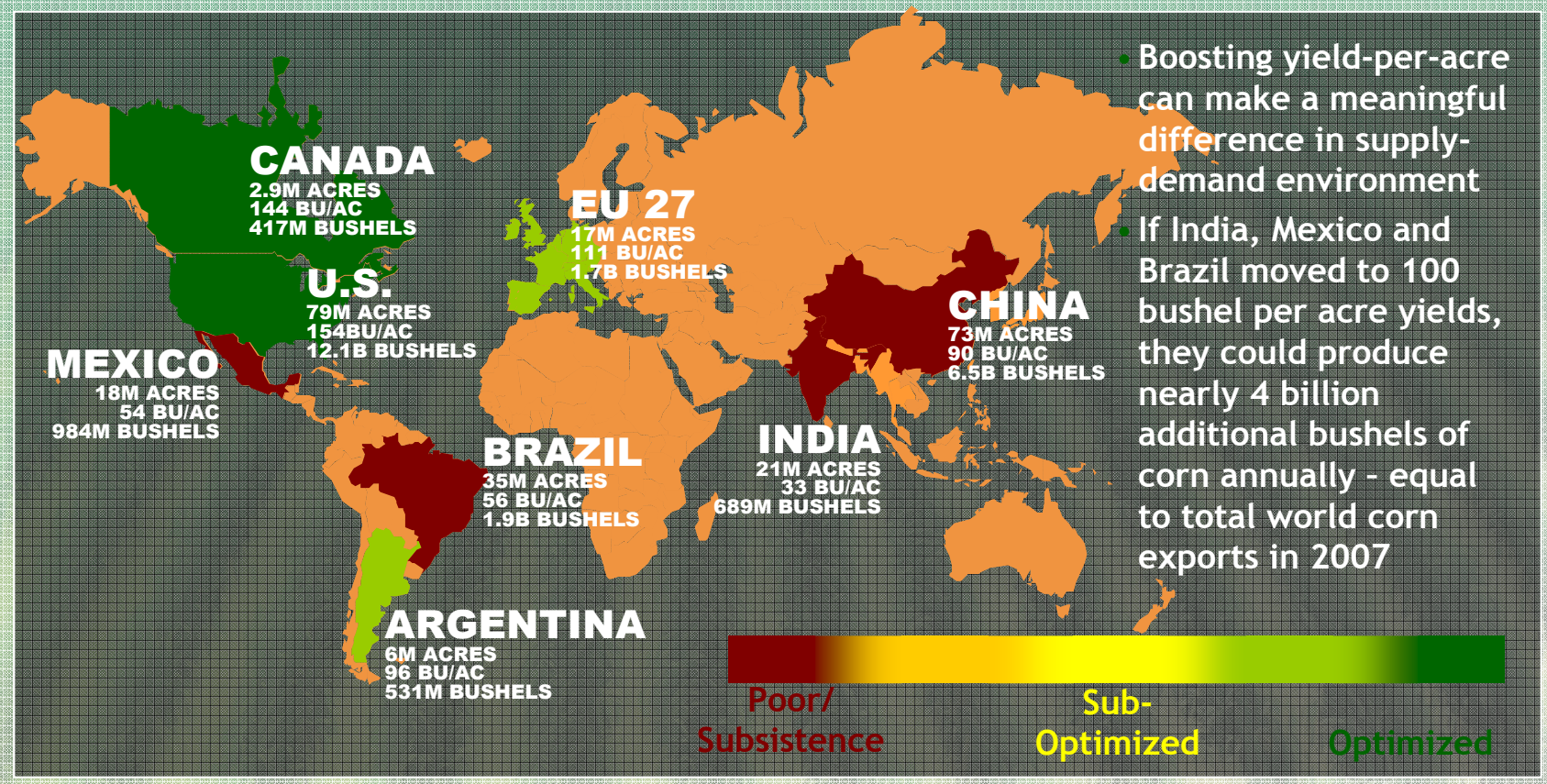
Results from 2008 field trials conducted in Illinois

# Combination of Breeding, Agronomic Practice Improvements and Biotech Can Maximize Yield Gains



# Global Corn Production Per Acre Is Sub-Optimized Today, Creating An Opportunity For Innovation

## GLOBAL CORN PRODUCTION[1]: Core Productivity Measures and Evaluation

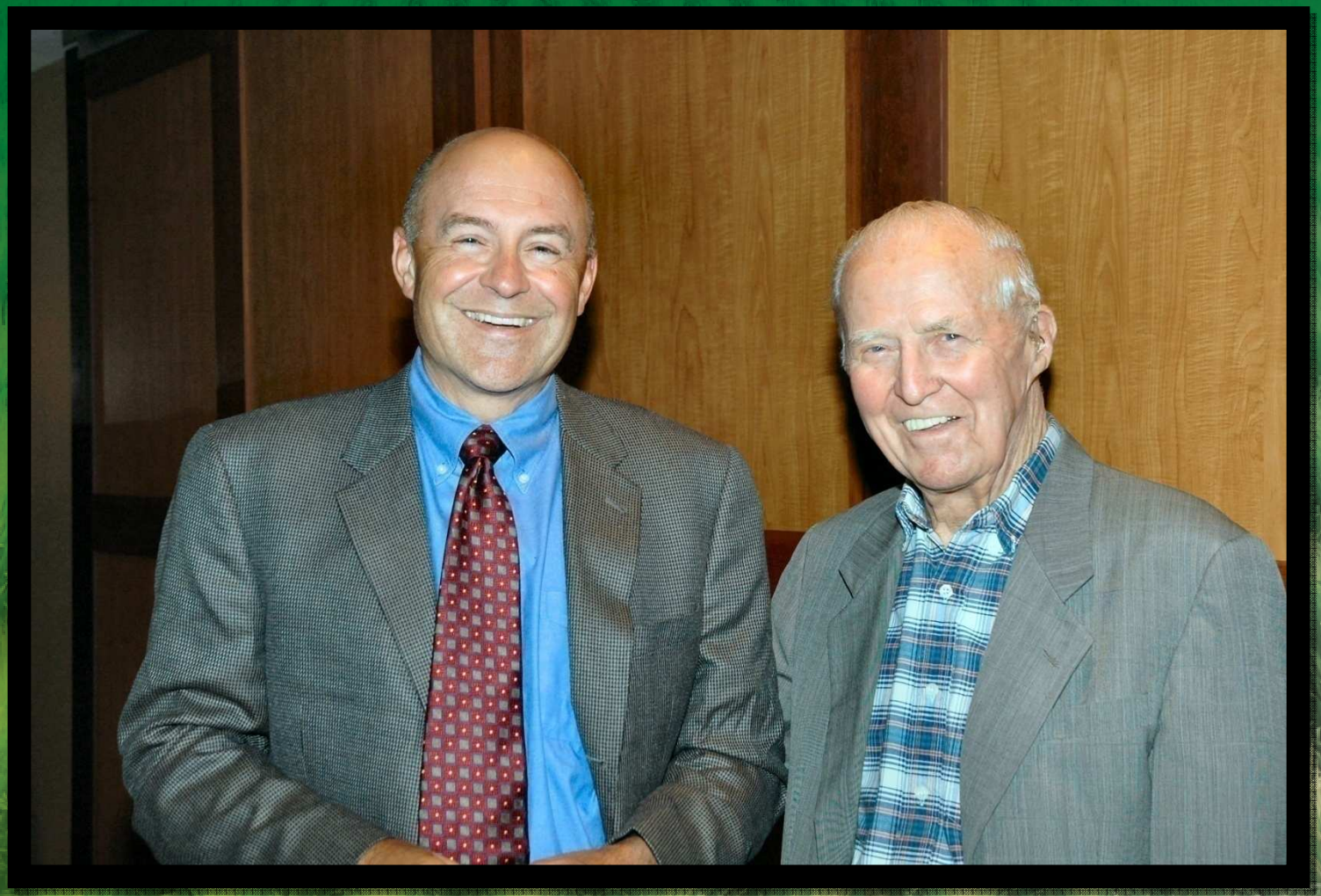



- Boosting yield-per-acre can make a meaningful difference in supply-demand environment
- If India, Mexico and Brazil moved to 100 bushel per acre yields, they could produce nearly 4 billion additional bushels of corn annually - equal to total world corn exports in 2007

YIELD PER ACRE OPTIMIZATION LEGEND

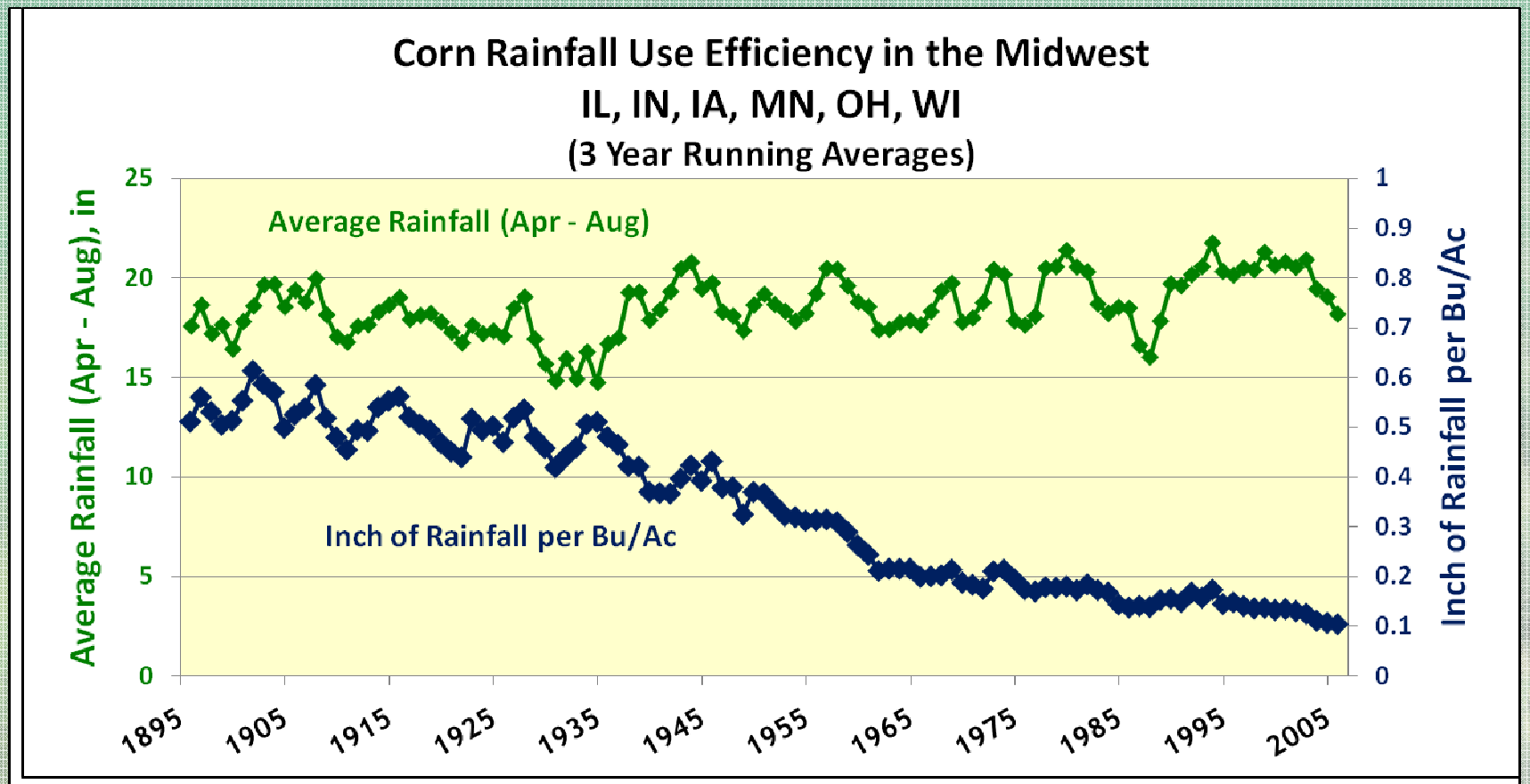
1. Source: Updated Feb 2009 - USDA FAS and internal estimates.

# A New Green and Gene Revolution…



# Produce More, Conserve More: Pesticide, Nitrogen, Rainfall Use Declining In Corn

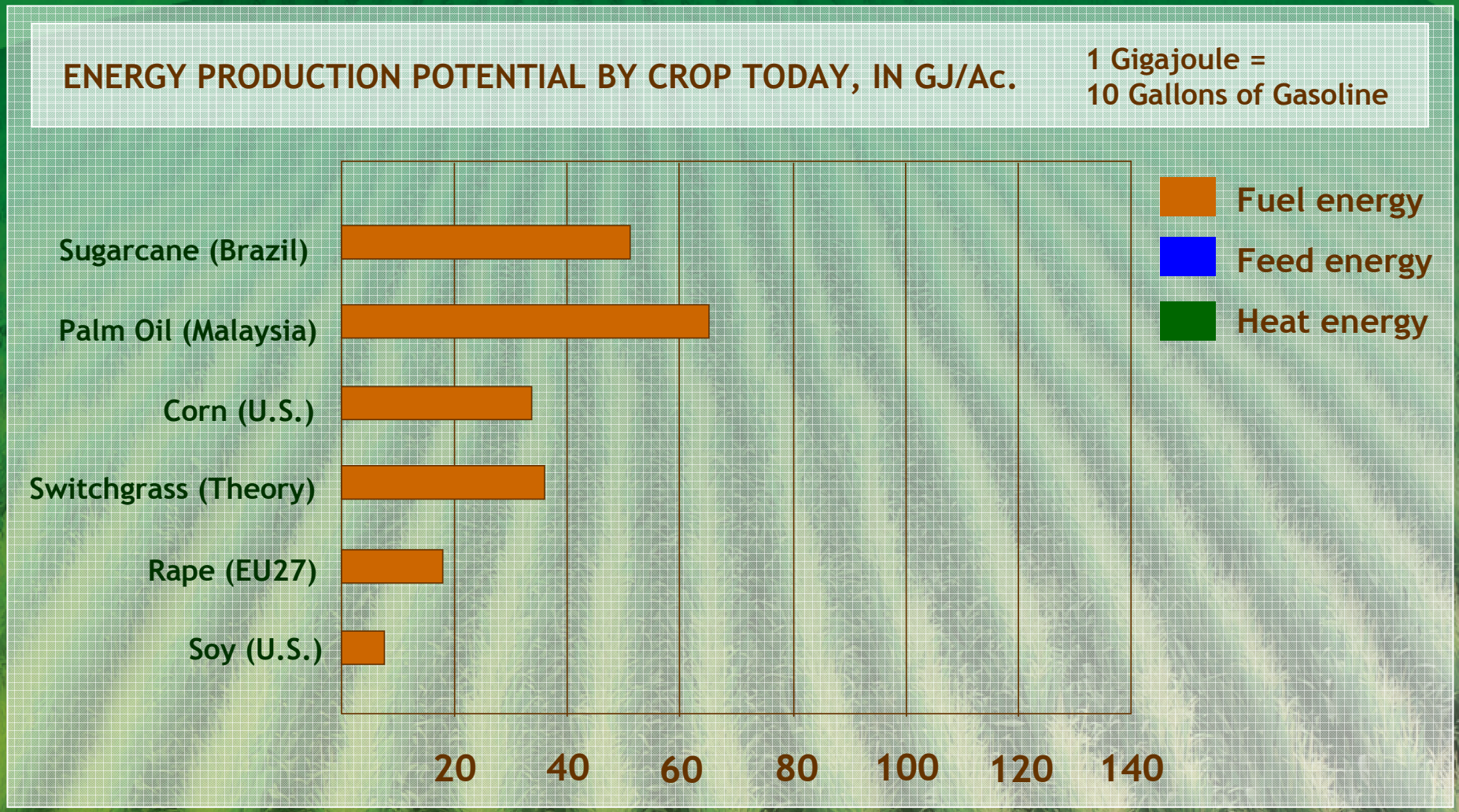
## U.S. CORN




**NOTE: ONE POUND OF NITROGEN = 24,500 BTUS**

Data Source: USDA, NASS "Agricultural Chemical Usage Report"; dmrkynetec; NOAA

# Corn is a Favorable Crop Choice for Biofuel Production



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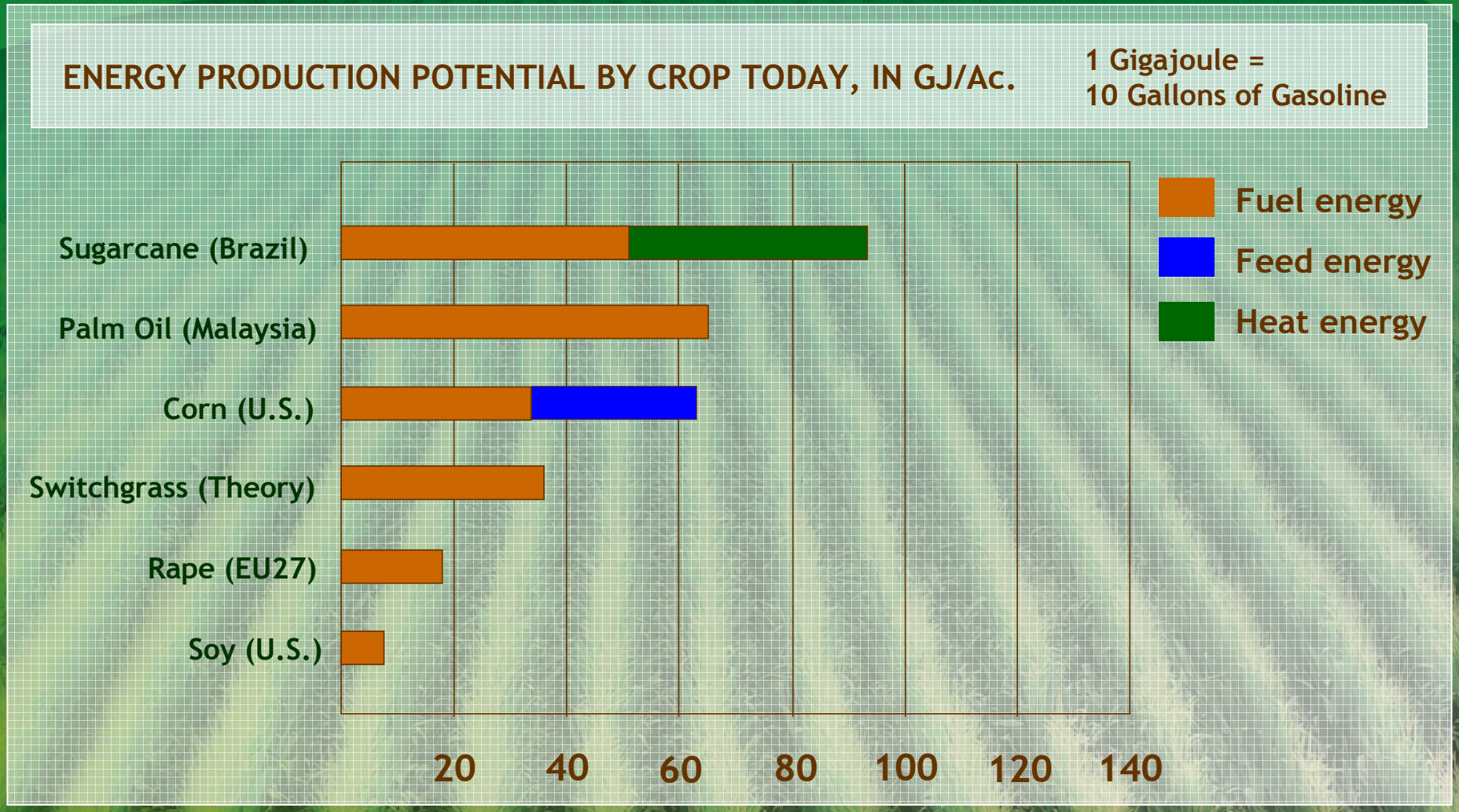
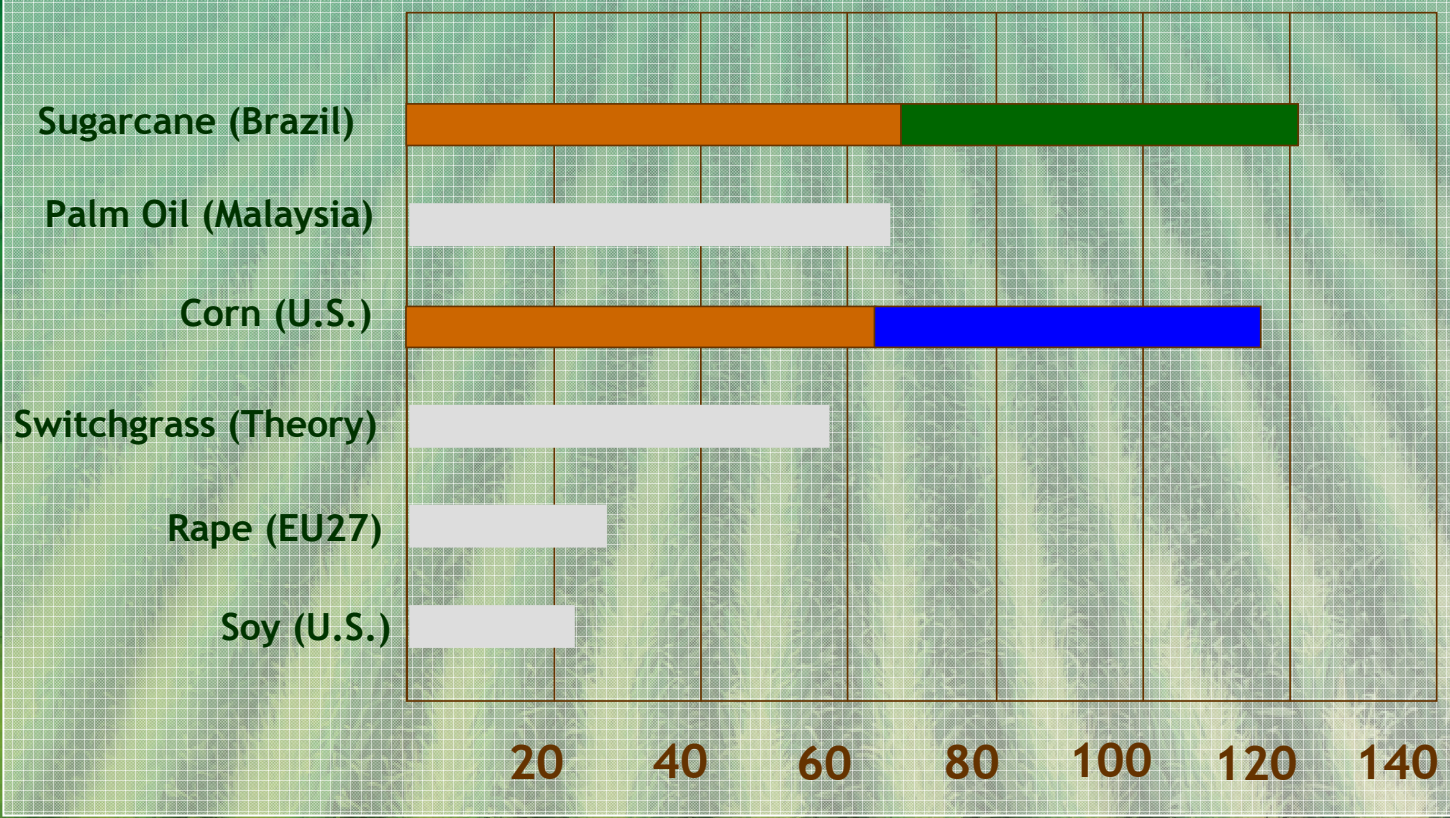


# Corn is a Favorable Crop Choice for Biofuel Production

ENERGY PRODUCTION POTENTIAL BY CROP IN 2030, IN GJ/Ac.

1 Gigajoule =
10 Gallons of Gasoline




**BOTTOM LINE:**
CONTINUED ADVANCEMENT IN CORN WILL IMPROVE ENERGY OUTPUT CONTRIBUTION OVER TIME

# Corn Stover Represents a Large Source of Biomass

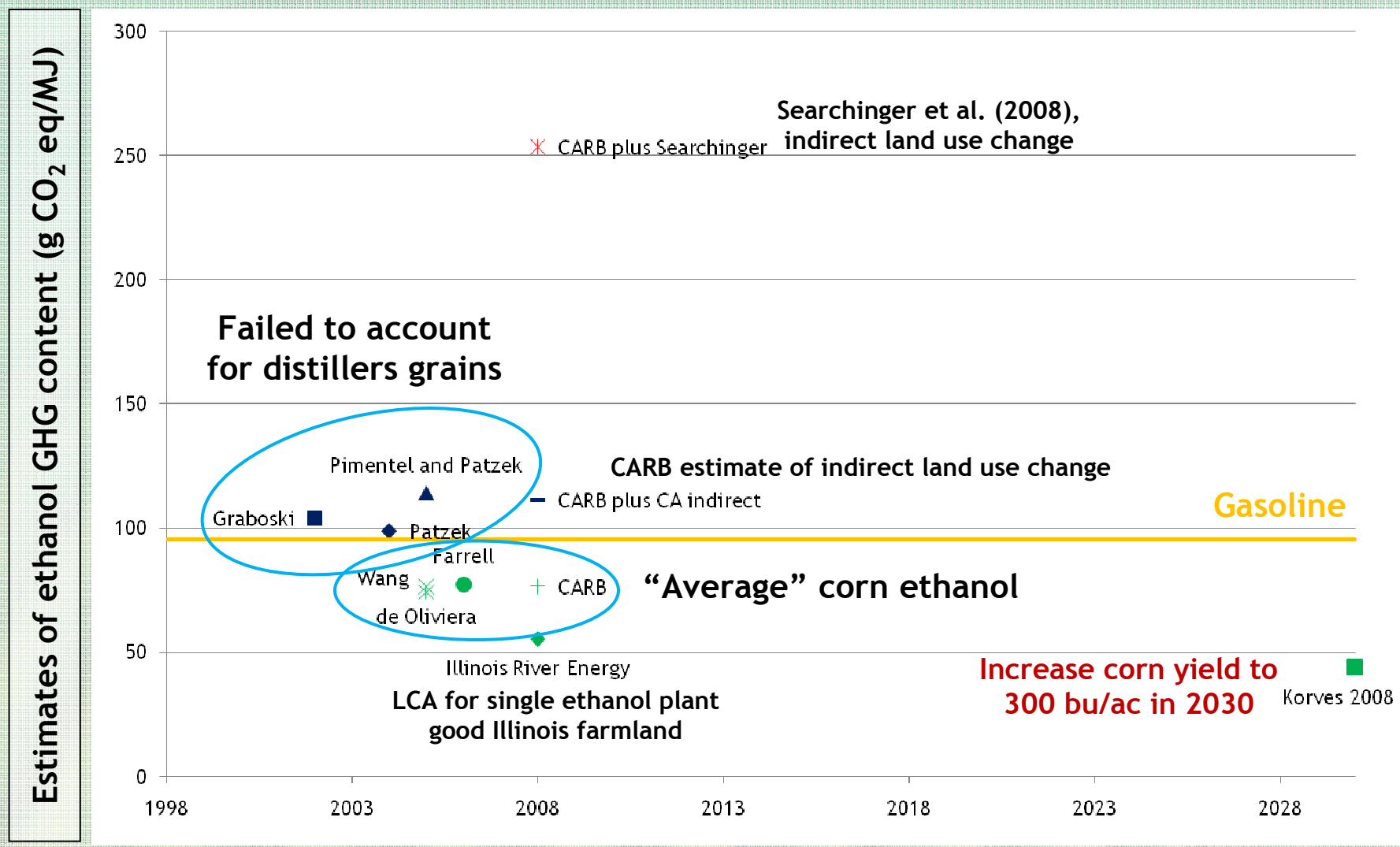
**STOVER IS THE NON-GRAIN PART OF THE CORN PLANT (LEAVES, STALKS AND COBS)**

- Stover mass increases with grain yield
- Some stover must be returned to the soil, but soil requirements don't increase with yield
- Excess stover is an opportunity to convert 'trash' into a valuable commodity

- Stover has many potential uses:
  - Power value ~ $35/ton
  - Feed value ~ $60/ton
  - Fuel value ~ $120/ton

Photo: USDA

# Estimates of GHG Emissions Decrease as Assumptions Improve

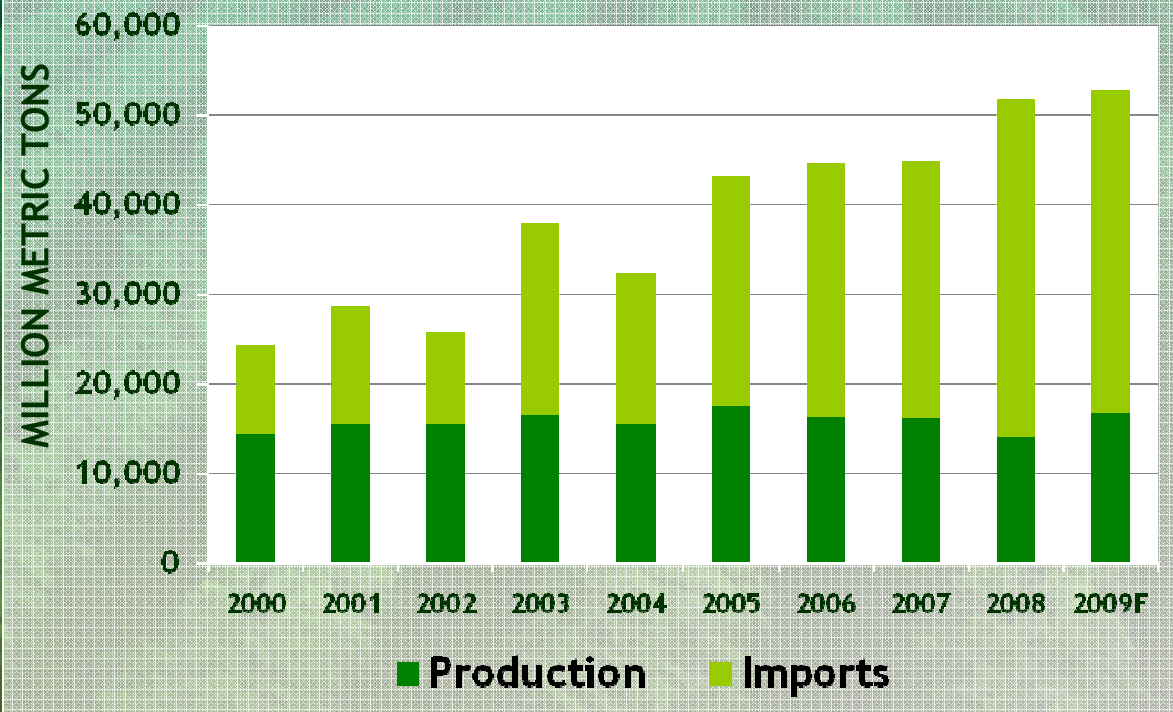



Lifecycle values from California Air Resources Board (CARB) used as baseline

# China Is Changing the Global Grain Landscape, Emerging as a Major Soybean Importer

## IN 2008, CHINA IMPORTED OVER 37MMT OF SOYBEANS

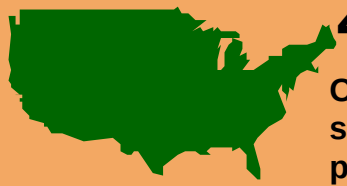
### CHINA'S GROWING SOYBEAN DEMAND:
**DOMESTIC PRODUCTION AND IMPORTS[1]**




1. ProExporter 2000-2007; USDA Foreign Agricultural Service 2008-2009F

**STATE OF AGRICULTURE:**
**Emergence of China**

**China's 2008 soybean imports would be equivalent to:**



**40%**
Of annual U.S. soy production

**OR**

**60%**
Of annual Brazil soy production

**OR**

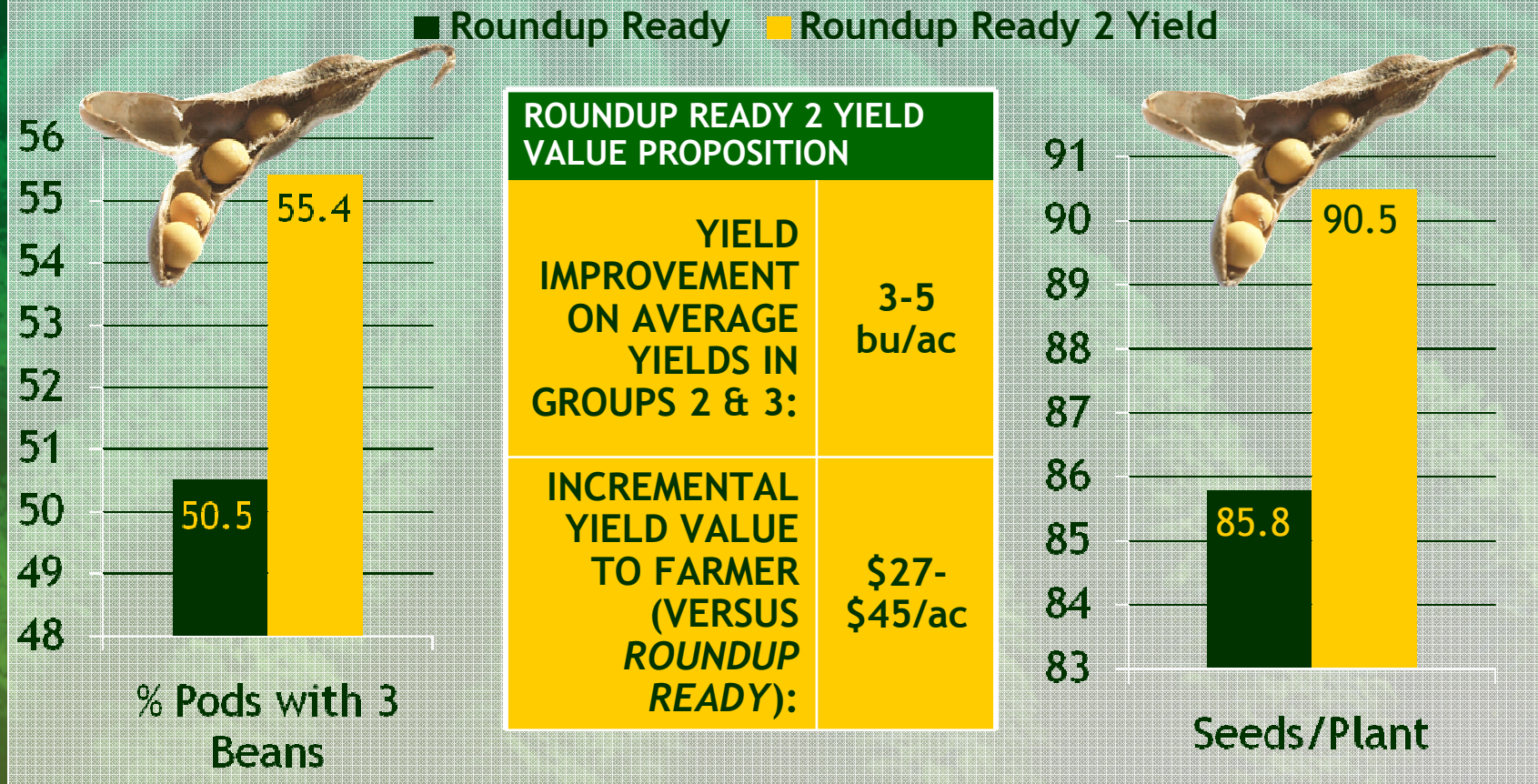
**75%**
Of annual Argentina soy production

# Future Soybean Products


Commercialization Depends on Many Factors, Including Successful Conclusion of Regulatory Process

# Roundup Ready 2 Yield™ Soybeans Produce More 3-Bean Pods/Plant and More Seeds/Plant

## ROUNDUP READY 2 YIELD CREATES A STEP CHANGE IN SOYBEAN YIELD




| ROUNDUP READY 2 YIELD VALUE PROPOSITION | |
|---|---|
| YIELD IMPROVEMENT ON AVERAGE YIELDS IN GROUPS 2 & 3: | 3-5 bu/ac |
| INCREMENTAL YIELD VALUE TO FARMER (VERSUS *ROUNDUP READY*): | $27-$45/ac |

# Dicamba-Tolerant Soybeans Provide Improved Weed Control Options

## DICAMBA-TOLERANT SOYBEANS

- Provide new, unique mode of action, designed to provide soybean growers with most effective weed management system available when stacked with Roundup Ready 2 Yield™
- Improved weed control options with two modes-of-action

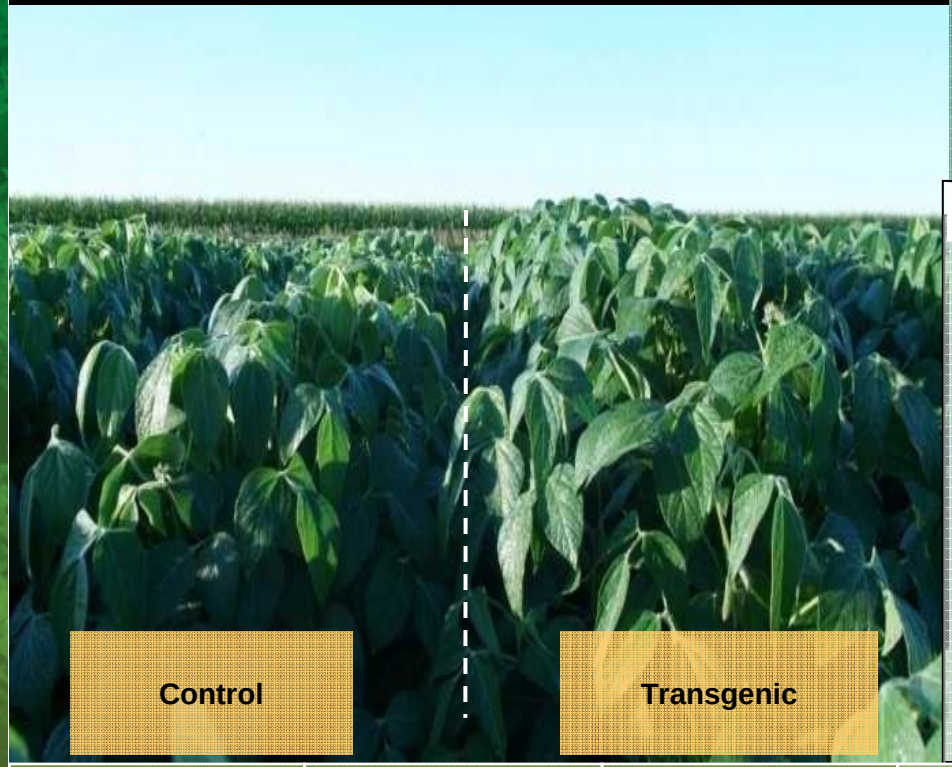

| Discovery | Phase 1 Proof of Concept | Phase 2 Early Development | Phase 3 Adv. Development | Phase 4 Pre-Launch | Launch |
|---|---|---|---|---|---|

# Higher-Yielding Soybeans Continue to Demonstrate Improved Yield over Conventional Controls

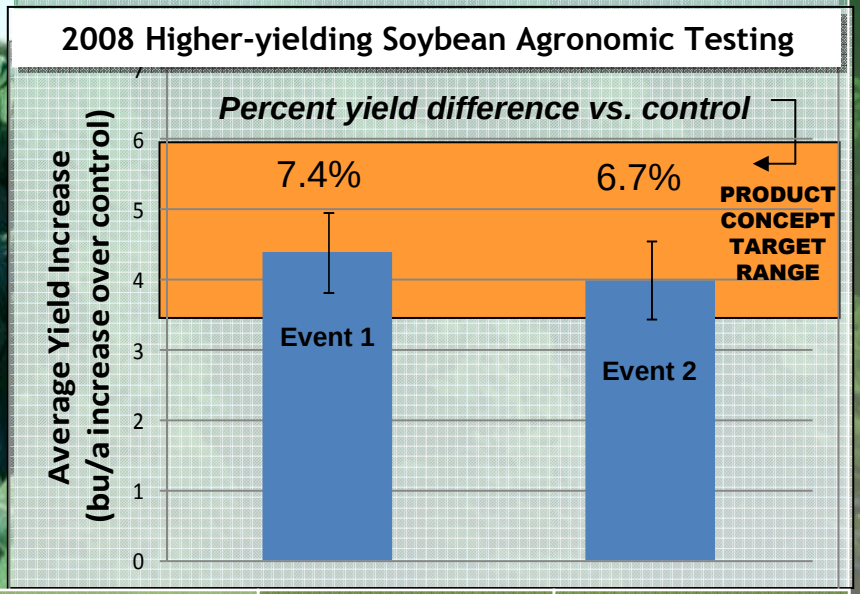
## SOYBEAN YIELD INTRINSIC DEVELOPMENT MOVES TO PHASE 3

COLLABORATION WITH BASF The Chemical Company

Dayton, IA – 2008




- Lead events showing strong yield advantages over controls across three seasons of testing
- Higher-yielding trait builds upon established yield platform of Roundup Ready 2 Yield and provides differentiation for modified oil portfolio through stacking




| Discovery | Phase 1 Proof of Concept | Phase 2 Early Development | Phase 3 Adv. Development | Phase 4 Pre-Launch | Launch |
|---|---|---|---|---|---|

Meta Analysis of Three Seasons of Data in 56 Environments

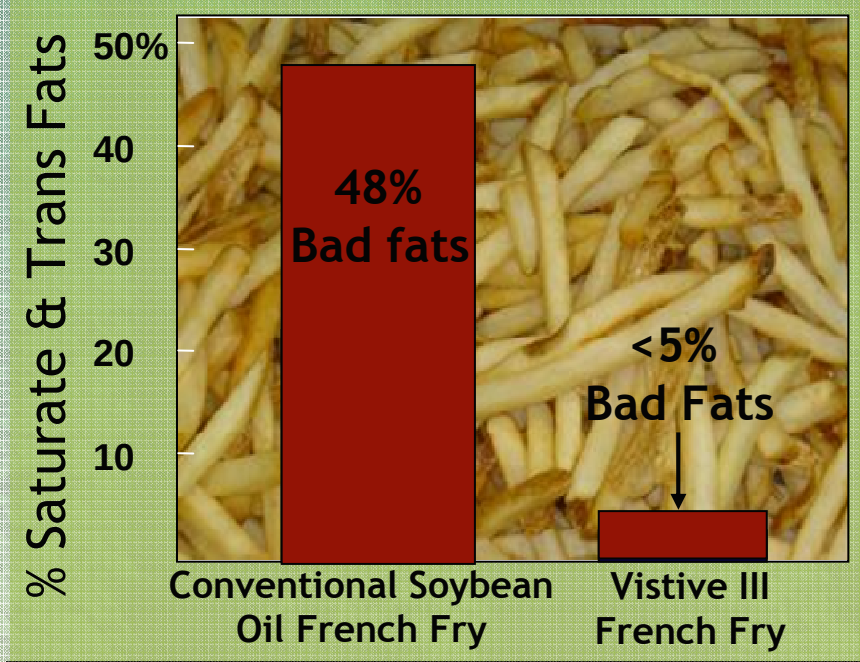
# Vistive® III High-Oleic, Low-Linolenic, *Lower Saturated Fat* Soybean Oil

## OFFERS ENHANCED FRY STABILITY, LOWERS BAD FATS

Vistive
a better soybean oil, naturally

- Designed to lower linolenic and saturate content, while boosting oleic content for an oil profile similar to olive oil
- Enhanced fry stability based on oil quality and fry life of the oil without any negative flavors
- 3 years of field data in the U.S. and Argentina indicates that yield is not statistically different from control

### Saturated and Trans Fat Content





**Vistive III provided a 90% reduction in saturated trans fat***

| Discovery | Phase 1<br>Proof of Concept | Phase 2<br>Early Development | Phase 3<br>Adv. Development | Phase 4<br>Pre-Launch | Launch |
|---|---|---|---|---|---|

*Versus hydrogenated oils

# Improvements in Agronomic Practices Will Continue to Positively Impact Yield

MORE THAN 10 BUSHELS CAN BE REALIZED BY SUCH IMPROVEMENTS

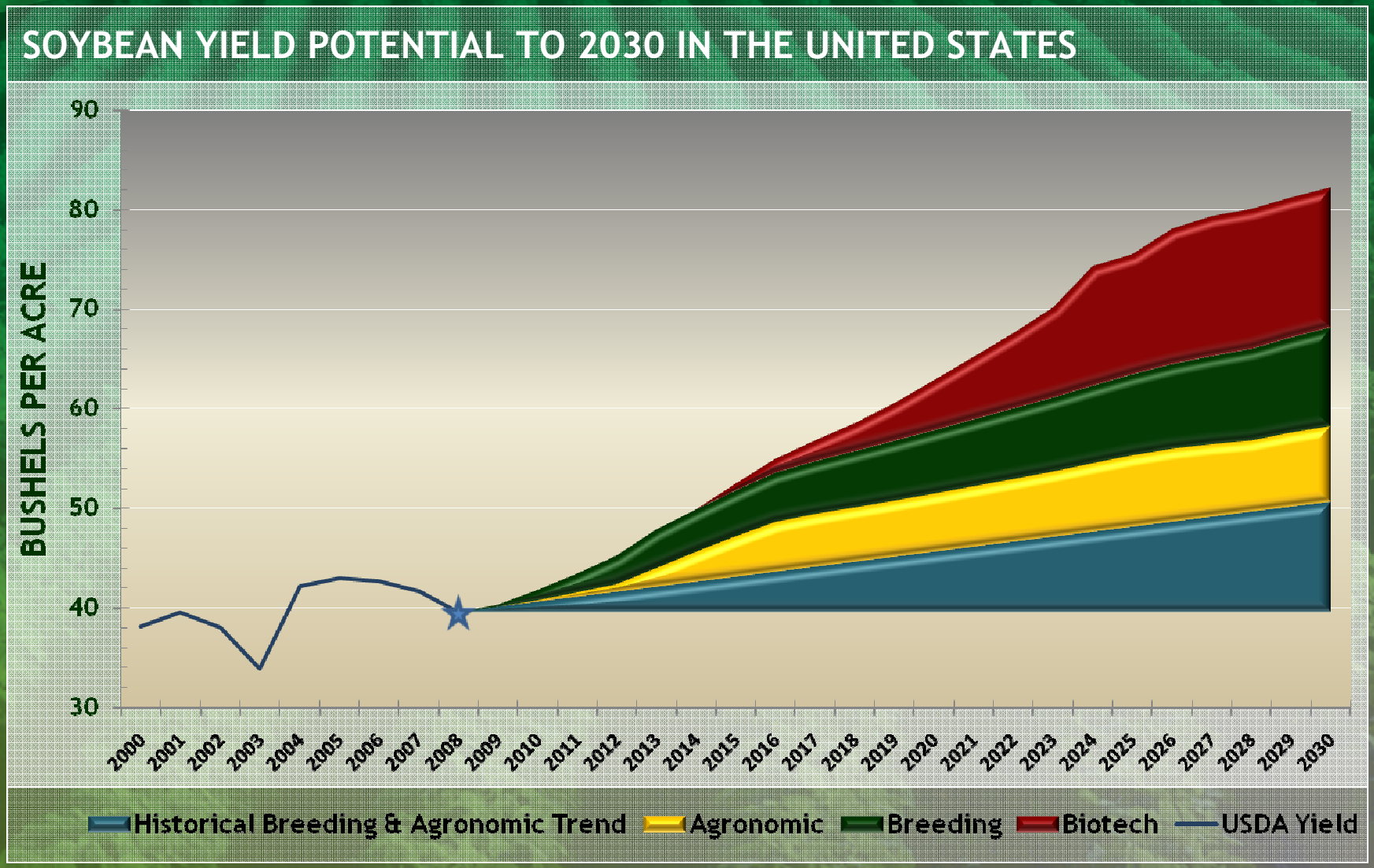

EXAMPLE: Increased use of soybean fungicides will:

- ✓ Increase yield
- ✓ Improve seed quality

## Sets The Stage For Benefits That Biotech Can Continue To Provide

Headline is a registered trademark of BASF

# Soybean Yield Components to 2030



# How can We Work Together to Make This Future a Reality?

## PRIORITIES

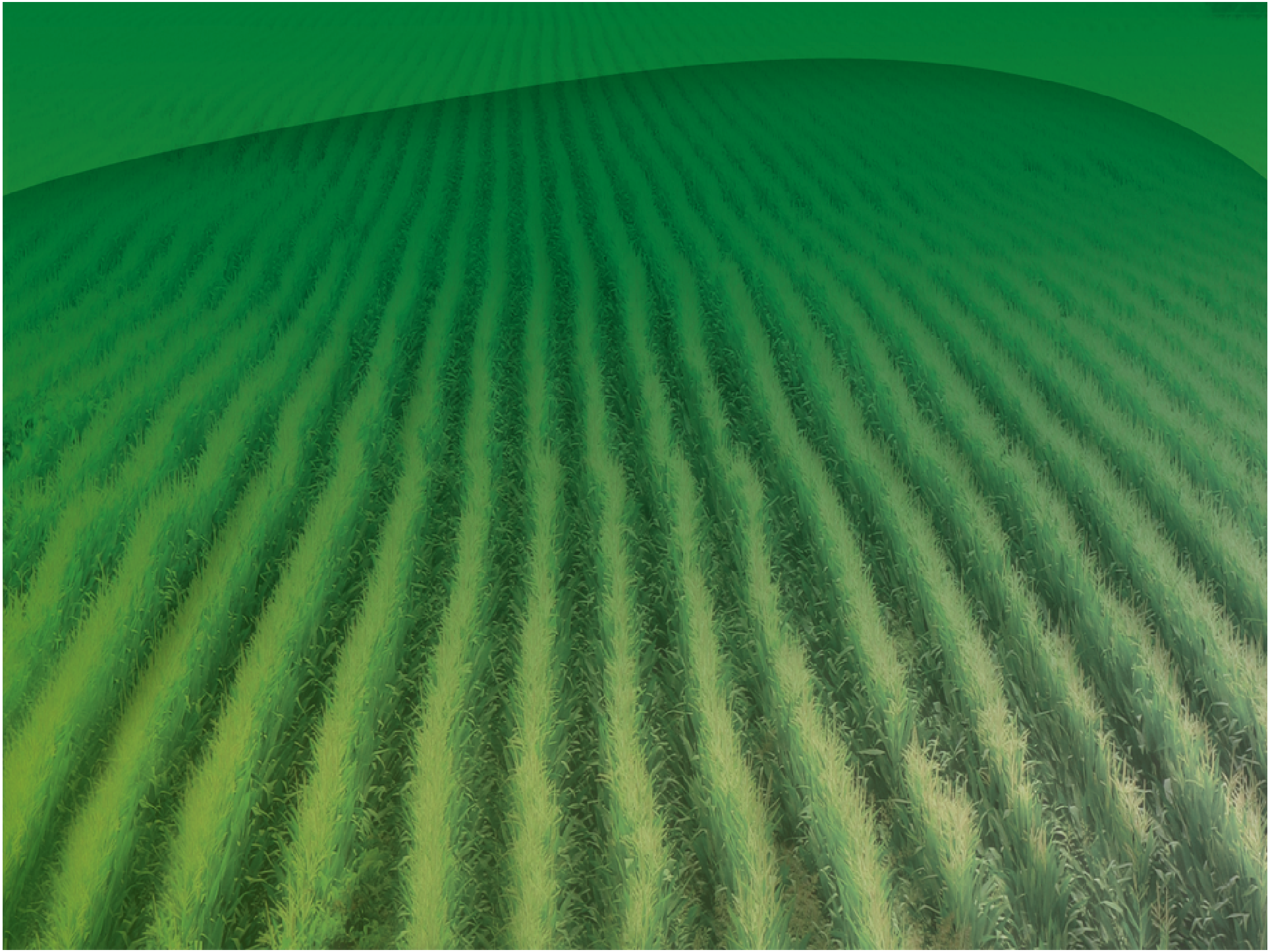
- We have a role and responsibility to help address global agricultural issues

## OPPORTUNITIES

- New technologies - such as next-generation breeding technology, soy and corn traits - play an integral part

## CHALLENGES

- Engage partners in agriculture from *outside* of the seed industry – our 'partners in productivity' can help us meet demand…*drive agronomic system improvements*
- *Investing in infrastructure* to handle growth of value-added traits
- *Investing in education* for a well-qualified workforce to drive future innovation



# The U.S. Seed Industry's Research Priorities Must Be Focused on *Meeting Demand Sustainably*

**PRIORITIES**

- We have a role and responsibility to help address global agricultural issues
- This can be boiled down to *meeting demand sustainably*

**CHALLENGES**

- Ensure global food and energy security in the face of challenges like population, water and land limits
- Investing in infrastructure to handle growth of value-added traits
- Investing in education for a well qualified workforce to drive future innovation

**OPPORTUNITIES**

- New technologies – such as next-generation breeding technology, soy and corn traits – play an integral part
- Engage partners in agriculture from *outside* of the seed industry – our 'partners in productivity' can help us meet demand